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amnion or the *Reichert'sche deckschicht*, Rauber, subzonal membrane, Turner, serous envelope, von Baer, and the true amnion, are formed, is cast off at birth or when incubation is completed. A highly vascular allantois is also developed in the majority of the species of this group, and, as a rule, takes the most important share in the respiratory functions of the embryo, and in the development of the fœtal part of the placenta whenever that organ is present.—*J. A. Ryder.* [*To be continued.*]

PHYSIOLOGY.[1]

PFLÜGER'S "AVALANCHE THEORY" OF NERVE-CONDUCTION.—M. Vulpian calls attention to the fact that in faradisation of various motor areas in the cerebral cortex of the dog, the effective strength of current which must be used varies definitely with the region stimulated. The minimal effective strength of current for the muscles of the face is less than that for the muscles of the fore-limb, and still less than for the muscles of the hind-limb. In general the strength of effective current must increase with the length of motor nerve tract. This result is readily explained if we consider that the nervous impulse started in the brain gradually diminishes in power as it passes along the motor nerve. But this assumption is in contradiction to the classic "avalanche theory" of Professor Pflüger, according to which the nerve impulse accumulates energy in its progress, so that a certain strength of stimulus applied to a motor nerve produces a stronger contraction the farther the place excited is removed from the muscle. It is this theory which Vulpian undertakes to test, and concludes with a denial of its adequacy.

In Vulpian's experiments dogs were used and so heavily chloralized as to paralyze the reflex powers of the spinal cord. He carefully isolated, without cutting, the external popliteal branch of the sciatic nerve and also the anterior tibial nerve. These nerves are in the dog of about the same thickness. Vulpian found that with a weak current strong flexion of the foot was brought about by stimulating the anterior crural, while no movement was produced when the popliteal branch was excited with the same current. He therefore concludes that the nervous impulse, far from gathering strength in its passage along a nerve, is used up in its progress and gradually diminishes in intensity.—*Comptes Rendus, Tome C, p. 1038.*

MOVEMENT OF THE RETINAL CONES UNDER THE INFLUENCE OF LIGHT.—But three kinds of physiological change have been observed in the retina as an effect of the action of light: 1. The electrical currents discovered by Holmgren; 2. The bleaching of the visual purple in the outer segments of the retinal rods; 3. The movement of the pigment in the outermost or epithelial

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[1] This department is edited by Professor HENRY SEWALL, of Ann Arbor, Michigan.

layer of the retina; both the latter phenomena were discovered by Boll. But Professor Engelmann, of Utrecht, adds another to the objective disturbances caused by light in the retina, namely, that of movement of the inner segment of the retinal cones. The inner segments of the cones become shorter under the influence of light and longer when the light is removed. The amount of this difference in length owing to illumination varies in different animals. The difference was most marked in the fish and frog. In a fish which was kept eight hours in the dark the inner cone segments, measuring from the *mem. lim. ext.* to the inner pole of the cone ellipsoid, had a length of about 50μ; after remaining several hours in diffuse daylight the length of the inner cone segments in the same animal was only about 5μ. In preparing the retina for observation the eye-ball was rapidly excised and plunged in 3.5 per cent nitric acid, or for several minutes was warmed to 70°–80° C. in 0.5 per cent salt solution.

A frog which has been kept in the dark shows maximal contraction of the cones after several minutes exposure to diffuse daylight. All parts of the visible spectrum produce the change in question, but the more refrangible rays have apparently most marked influence. It is apparently the inner cone segment itself which is directly affected by the stimulus. The movement of the cones and of the epithelial pigment seems to be under the control of the nervous system; for if an animal which has been kept long enough in the dark to bring about maximal lengthening of the cones and retreat of the pigment, be exposed to light so that only one eye is illuminated, the influence of the light is manifested by both retinas; but if the brain has been previously destroyed, the contraction of the cones and the moving inward of the pigment occur only in the eye which is directly exposed to light. We may, therefore, consider that the movements in question are reflex actions, and that the optic nerves contain *motor* fibers for the protoplasm of the cones and of the retinal epithelium. Engelmann declares also that light acting directly upon the skin of a frog whose head is kept in the dark, brings about the same retinal changes as does light falling directly upon the eyes.—*Pflüger's Archiv., Bd. 35, s. 498.*

PSYCHOLOGY.

APPLIED METAPHYSICS OF SEX.—When ethics is reduced to a science it is a department of metaphysics. Its application to practice will be "morals." One of its data is the law of Confucius, that man should not do to another what he would not wish that another should do to himself. The converse of this proposition, as uttered by Christ, imposes a greater proportion of active measures. Both are relatively carried into practice to the degree in which the wishes of men are subordinated to their intelligence.